

Abstract

In cognitive multimedia mesh networks (CMMNs), unlicensed users (secondary users, SUs) can share the spectrum with licensed users (primary users, PUs) on a non-interfering basis. The main challenge in CMMN is how to implement an efficient optimal control policy that can allocate spectrum and transmission powers for the SUs efficiently and how to adapt these resources to the changing network conditions. The power management scheme should control the SUs powers in such a way that their data communication rate is not affected. SUs power cannot be dropped indefinitely but it should be bounded such that the quality of service (QoS) for the SUs is still supported. Our objective is to serve the maximum number of users and support their QoS while protecting the PUs' rights of using the spectrum exclusively. Due to the direct relationship between the data rate and the quality of the communication channel, we propose a new spectrum allocation scheme that exploits the physical properties of the channel to achieve better performance. In addition to consider QoS for users, our scheme uses several heuristics for selecting channels that meet users requirements. These heuristics include channel error rates, PUs activities, channel capacity and channel adaptation time. Performance evaluation of the proposed scheme shows that the scheme is able to support additional SUs traffic while still ensuring PUs QoS.